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QUALCOMM INCORPORATED
5775 MOREHOUSE DR.
SAN DIEGO, CA 92121

EXAMINER	
ALIA, CURTIS A	

ART UNIT	PAPER NUMBER
2416	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

us-docketing@qualcomm.com
kascanla@qualcomm.com
nanm@qualcomm.com

Office Action Summary	Application No.	Applicant(s)	
	10/781,951	WALTON ET AL.	
	Examiner	**Art Unit**	
	Curtis A. Alia	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23 and 63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23 and 63* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :17 January 2006, 2 September 2008.

DETAILED ACTION

Response to Amendment

Applicant's amendment filed 5 October 2008 has been entered. Claims 1-23 have been elected without traverse along with the species corresponding to Figure 8. Claims 24-62 have been cancelled and claim 63 has been added. Claims 1-23 and 63 are still pending in this application, with claims 1, 14, 19 and 63 being independent.

Double Patenting

1. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

2. Claims 1-23 and 63 are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-8, 10-24 and 65 of copending Application No. 10/794,918. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 63 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim term “software storage apparatus” is not supported by the specification. The nearest term in the specification is a “memory unit” in paragraph 121. A correction of the claim language is required to overcome this written description requirement since the use of the term "a software storage apparatus" is considered introduction of new matter. For the purposes of examination, claim 63 will be examined as if it were a memory unit performing the instructions detailed in the claim.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites that the spatial processing is performed only on data symbols, while claim 1, from which claim 8 depends, recites that spatial processing is performed on both the pilot symbols and data symbols. The two claims seem to contradict each other since the inclusion of

claim 1's limitations into claim 8 by dependence seem to suggest that the spatial processing is performed on both pilot and data symbols and only data symbols.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 5, 14, 16, 19, 21, and 63 are rejected under 35 U.S.C. 102(e) as being anticipated by Trikkonen (US 2004/0002364).

Regarding claim 1, Trikkonen discloses a method of transmitting data from a transmitting entity to a receiving entity in a wireless multi-antenna communication system utilizing orthogonal frequency division multiplexing (OFDM), comprising processing a data packet to obtain a block of data symbols (see paragraph 77, receiving data, processing data streams for transmission), demultiplexing pilot symbols and the block of data symbols onto a plurality of subbands to obtain, for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands (see paragraphs 59-61, pilot signals are prepared for transmission, separated from the data stream, and multiple antennas are ready to transmit the data along separate bands) and performing spatial processing on the sequence of pilot and data symbols for each subband with at least one steering vector selected for the subband, the spatial processing randomizing a plurality of effective single-input single-output (SISO) channels observed by the

plurality of sequences of pilot and data symbols sent on the plurality of subbands (see paragraphs 145-155, beamforming is used to steer the radio signal from the antennas (spatial processing), and sent across multiple antennas (plurality of SISO = MIMO)).

Regarding claim 5, Trikkonen does not explicitly teach that the sequence of pilot and data symbols for each subband is spatially processed with at least two steering vectors selected for the subband. However, it would have been an obvious matter of design choice to provide two or more steering vectors per subband as opposed to just one, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art.

Regarding claim 14, Trikkonen discloses an apparatus in a wireless multi-antenna communication system utilizing orthogonal frequency division multiplexing (OFDM), comprising a data processor operative to process a data packet to obtain a block of data symbols (see paragraph 77, receiving data, processing data streams for transmission), a demultiplexer operative to demultiplex pilot symbols and the block of data symbols onto a plurality of subbands to obtain, for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands (see paragraphs 59-61, pilot signals are prepared for transmission, separated from the data stream, and multiple antennas are ready to transmit the data along separate bands) and a spatial processor operative to perform spatial processing on the sequence of pilot and data symbols for each subband with at least one steering vector selected for the subband, the spatial processing randomizing a plurality of effective single-input single-output

(SISO) channels observed by the plurality of sequences of pilot and data symbols sent on the plurality of subbands (see paragraphs 145-155, beamforming is used to steer the radio signal from the antennas (spatial processing), and sent across multiple antennas (plurality of SISO = MIMO)).

Regarding claim 16, Trikkonen does not explicitly teach that the spatial processor is operative to spatially process the sequence of pilot and data symbols for each subband with at least two steering vectors selected for the subband. However, it would have been an obvious matter of design choice to provide two or more steering vectors per subband as opposed to just one, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art.

Regarding claim 19, Trikkonen discloses an apparatus in a wireless multi-antenna communication system utilizing orthogonal frequency division multiplexing (OFDM), comprising means for processing a data packet to obtain a block of data symbols (see paragraph 77, receiving data, processing data streams for transmission), means for demultiplexing pilot symbols and the block of data symbols onto a plurality of subbands to obtain, for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands (see paragraphs 59-61, pilot signals are prepared for transmission, separated from the data stream, and multiple antennas are ready to transmit the data along separate bands), and means for performing spatial processing on the sequence of pilot and data symbols for each subband with at least one steering vector selected for the subband, the spatial processing randomizing a plurality of effective single-

input single-output (SISO) channels observed by the plurality of sequences of pilot and data symbols sent on the plurality of subbands (see paragraphs 145-155, beamforming is used to steer the radio signal from the antennas (spatial processing), and sent across multiple antennas (plurality of SISO = MIMO)).

Regarding claim 21, Trikkonen does not explicitly teach that the sequence of pilot and data symbols for each subband is spatially processed with at least two steering vectors selected for the subband. However, it would have been an obvious matter of design choice to provide two or more steering vectors per subband as opposed to just one, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art.

Regarding claim 63, Trikkonen discloses a software storage apparatus for processing data for transmission from a transmitting entity to a receiving entity in a wireless multi-antenna communication system utilizing orthogonal frequency division multiplexing (OFDM) comprising a memory, the memory having instructions stored thereon, the instructions being executable by one or more processors (see paragraph 44, processors are present in the device which would be able to execute instructions) and the instructions comprising instructions for processing a data packet to obtain a block of data symbols (see paragraph 77, receiving data, processing data streams for transmission), instructions for demultiplexing pilot symbols and the block of data symbols onto a plurality of subbands to obtain, for the data packet, a plurality of sequences of pilot and data symbols for the plurality of subbands (see paragraphs 59-61, pilot

signals are prepared for transmission, separated from the data stream, and multiple antennas are ready to transmit the data along separate bands), and instructions for performing spatial processing on the sequence of pilot and data symbols for each subband with at least one steering vector selected for the subband, the spatial processing randomizing a plurality of effective single-input single-output (SISO) channels observed by the plurality of sequences of pilot and data symbols sent on the plurality of subbands (see paragraphs 145-155, beamforming is used to steer the radio signal from the antennas (spatial processing), and sent across multiple antennas (plurality of SISO = MIMO)).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2, 3, 7, 15, 17, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Ketchum et al. (US 2003/0108117, published 12 June 2003).

Regarding claim 2, Trikkonen does not explicitly teach that the sequence of pilot and data symbols for each subband is spatially processed with one steering vector selected for the subband.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the sequence of pilot and data symbols for each subband is spatially processed with one steering vector selected for the subband (see paragraph 12, each stream is given one Eigen mode, Eigen mode being a spatial subchannel).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Ketchum, since

Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 3, Trikkonen does not explicitly teach that a plurality of different steering vectors is used for the plurality of subbands.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that a plurality of different steering vectors are used for the plurality of subbands (see paragraph 11, there are two sets of steering vectors used by the system, thus different steering vectors are used for the subbands).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 7, Trikkonen does not explicitly teach that the at least one steering vector used for spatial processing for each subband is known only to the transmitting entity and the receiving entity.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the at least one steering vector used for spatial processing for each subband is known only to the transmitting entity and the receiving entity (see paragraph 12, the steering vector known to the transmitting station is sent to the receiving

station, therefore the transmitting station and the receiving station both know the steering vectors).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 15, Trikkonen does not explicitly teach that the spatial processor is operative to spatially process the sequence of pilot and data symbols for each subband with one steering vector selected for the subband.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the spatial processor is operative to spatially process the sequence of pilot and data symbols for each subband with one steering vector selected for the subband (see paragraph 12, each stream is given one Eigen mode, Eigen mode being a spatial subchannel).

In view of the above, having the apparatus of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the apparatus of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 17, Trikkonen does not explicitly teach that the at least two steering vectors for each subband are known only to a transmitting entity and a receiving entity for the data packet.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the at least two steering vectors for each subband are known only to a transmitting entity and a receiving entity for the data packet (see paragraph 12, the steering vector known to the transmitting station is sent to the receiving station, therefore the transmitting station and the receiving station both know the steering vectors).

In view of the above, having the apparatus of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the apparatus of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 20, Trikkonen does not explicitly teach that the sequence of pilot and data symbols for each subband is spatially processed with one steering vector selected for the subband.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the sequence of pilot and data symbols for each subband is spatially processed with one steering vector selected for the subband (see paragraph 12, each stream is given one Eigen mode, Eigen mode being a spatial subchannel).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

Regarding claim 22, Trikkonen does not explicitly teach that the at least two steering vectors for each subband are known only to a transmitting entity and a receiving entity for the data packet.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Ketchum. In particular, Ketchum teaches that the at least two steering vectors for each subband are known only to a transmitting entity and a receiving entity for the data packet (see paragraph 12, the steering vector known to the transmitting station is sent to the receiving station, therefore the transmitting station and the receiving station both know the steering vectors).

In view of the above, having the apparatus of Trikkonen, then given the well-established teaching of Ketchum, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the apparatus of Trikkonen as taught by Ketchum, since Ketchum stated in paragraph 10 that high throughput can be achieved without individually coding each frequency bin.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Ketchum as applied to claim 2 above, and further in view of Honig (US 6,956,897).

Regarding claim 4, Trikkonen and Ketchum do not explicitly teach that the one steering vector used for spatial processing for each subband is unknown to the receiving entity.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Honig. In particular, Honig teaches that the one steering vector used for spatial processing for each subband is unknown to the receiving entity (see column 3, lines 43+, the receiver generates an "estimated" steering vector, as opposed to the given steering vector being the steering vector known to the receiver).

In view of the above, having the method of Trikkonen and Ketchum, then given the well-established teaching of Honig, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen and Ketchum as taught by Honig, since Honig stated in column 1, lines 66+ that faster tracking and convergence with less training samples can be achieved.

14. Claims 6, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Walton et al. (US 2003/0235147, published 25 December 2003).

Regarding claim 6, Trikkonen does not explicitly teach that one pilot or data symbol is sent on each subband in each symbol period, and wherein the sequence of pilot and data symbols for each subband is spatially processed with a different steering vector for each symbol period.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Walton. In particular, Walton teaches that one pilot or data symbol is sent on each subband in each symbol period (see paragraph 110, each multiplier multiplies each symbol in its vector with its Walsh function to transmit two symbols per two consecutive symbol periods, thus averaging to one symbol per symbol period) and wherein the sequence of pilot and data symbols for each subband is spatially processed with a different steering vector for each symbol period (see paragraph 95, for each vector, the symbols are transmitted in different symbol periods on different antennas).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Walton, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Trikkonen as taught by Walton, since Walton stated that transmission diversity can be achieved with criteria such as channel conditions and receiver capabilities.

Regarding claim 10, Trikkonen does not explicitly teach selecting the at least one steering vector for each subband from among a set of L steering vectors, where L is an integer greater than one.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Walton. In particular, Walton teaches selecting the at least one steering vector for each subband from among a set of L steering vectors, where L is an integer greater than one (see paragraph 95, two vectors are generated).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Walton, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Trikkonen as taught by Walton, since Walton stated that transmission diversity can be achieved with criteria such as channel conditions and receiver capabilities.

Regarding claim 12, Trikkonen does not explicitly teach selecting a steering vector for each subband in each symbol period from among a set of L steering vectors, where L is an integer greater than one.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Walton. In particular, Walton teaches selecting a steering vector for each subband in each symbol period from among a set of L steering vectors, where L is an integer greater than one (see paragraphs 95 and 110, multiple steering vectors, where each steering vector belongs to a subband and a symbol period).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Walton, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Trikkonen as taught by Walton, since Walton stated that transmission diversity can be achieved with criteria such as channel conditions and receiver capabilities.

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Jasper et al. (US 6,441,786).

Regarding claim 8, Trikkonen does not explicitly teach that the spatial processing with the at least one steering vector for each subband is performed only on data symbols.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Jasper. In particular, Jasper teaches that the spatial processing with the at least one steering vector for each subband is performed only on data symbols (see column 9, lines 65+, steering vector is calculated for each data symbol).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Jasper, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Jasper, since Jasper stated that the effects of interference and noise can be limited.

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Shattil (US 2004/0086027).

Regarding claim 9, Trikkonen does not explicitly teach encoding the data packet in accordance with a coding scheme to obtain coded data, interleaving the coded data to obtain interleaved data, and symbol mapping the interleaved data in accordance with a modulation scheme to obtain the block of data symbols.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Shattil. In particular, Shattil teaches encoding the data packet in accordance with a coding scheme to obtain coded data, interleaving the coded data to obtain interleaved data, and symbol mapping the interleaved data in accordance with a modulation scheme to obtain the block of data symbols (see paragraph 88, data is encoded, then the coded data is interleaved by an interleaver, then the interleaved data is mapped into data symbols in a block).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Shattil, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Shattil, since Shattil stated in paragraph 32 that greater bandwidth efficiency can be achieved.

17. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Walton as applied to claim 10 above, and further in view of Hudson et al. (US 6,477,161).

Regarding claim 11, Trikkonen and Walton do not explicitly teach that the L steering vectors are such that any pair of steering vectors among the L steering vectors has low correlation.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Hudson. In particular, Hudson teaches that the L steering vectors are such that any pair of steering vectors among the L steering vectors have low correlation (see column 6, lines 3-12, correlation between vectors is either nonexistent (orthogonal) or very small).

In view of the above, having the method of Trikkonen and Walton, then given the well-established teaching of Hudson, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen and Walton as taught by Hudson, since Hudson stated that symbol detection can be improved.

18. Claims 13, 18, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Trikkonen in view of Lewis (US 2004/0102157).

Regarding claim 13, Trikkonen does not explicitly teach that each steering vector includes T elements having same magnitude but different phases, where T is the number of transmit antennas at the transmitting entity and is an integer greater than one.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Lewis. In particular, Lewis teaches that each steering vector includes T elements having same magnitude but different phases, where T is the number of transmit antennas at the transmitting entity and is an integer greater than one (see paragraph 4, lines 11+, plurality of antennas are weighted and given phase differences for each steering vector).

In view of the above, having the method of Trikkonen, then given the well-established teaching of Lewis, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the method of Trikkonen as taught by Lewis, since Lewis stated in paragraph 6 that location based services can be provided.

Regarding claim 18, Trikkonen does not explicitly teach that each steering vector includes T elements having same magnitude but different phases, where T is the number of antennas used to transmit the data packet and is an integer greater than one.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Lewis. In particular, Lewis teaches that each steering vector includes T elements having same magnitude but different phases, where T is the number of antennas used to transmit the data packet and is an integer greater than one (see paragraph 4, lines 11+, plurality of antennas are weighted and given phase differences for each steering vector).

In view of the above, having the apparatus of Trikkonen, then given the well-established teaching of Lewis, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the apparatus of Trikkonen as taught by Lewis, since Lewis stated in paragraph 6 that location based services can be provided.

Regarding claim 23, Trikkonen does not explicitly teach that each steering vector includes T elements having same magnitude but different phases, where T is the number of antennas used to transmit the data packet and is an integer greater than one.

However, the above-mentioned claimed limitation is well known in the art, as evidenced by Lewis. In particular, Lewis teaches that each steering vector includes T elements having same magnitude but different phases, where T is the number of antennas used to transmit the data packet and is an integer greater than one (see paragraph 4, lines 11+, plurality of antennas are weighted and given phase differences for each steering vector).

In view of the above, having the apparatus of Trikkonen, then given the well-established teaching of Lewis, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the apparatus of Trikkonen as taught by Lewis, since Lewis stated in paragraph 6 that location based services can be provided.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis A. Alia whose telephone number is (571) 270-3116. The examiner can normally be reached on Monday through Friday, 9am-6pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Aung S. Moe can be reached on (571) 272-7314. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aung S. Moe/
Supervisory Patent Examiner, Art Unit 2416

/Curtis A Alia/
Examiner, Art Unit 2416
10/21/2008

CAA